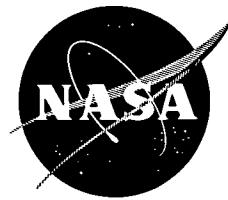
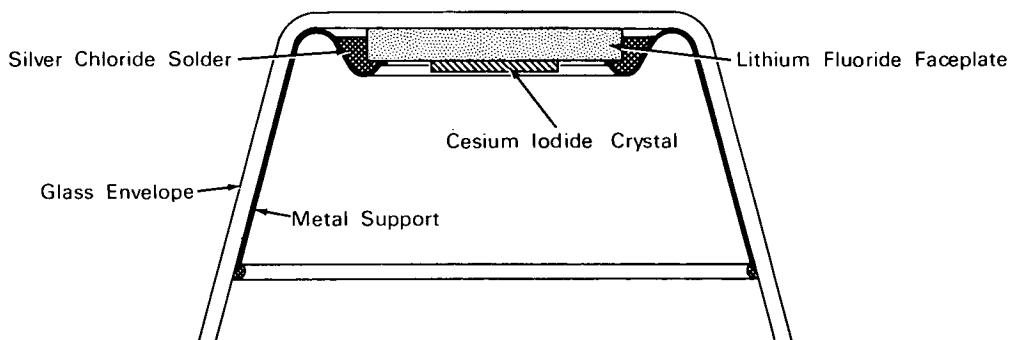


# NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the NASA space program.

## Cesium Iodide Crystals Fused to Vacuum Tube Faceplates



**The problem:** Attaching a thin crystal of thallium-activated cesium iodide phosphor to a spun metal support in a photon scintillator image tube. Attempts to attach the crystal directly to the metal support with silver chloride solder were unsuccessful because interaction of the melted solder destroyed the structure and scintillation characteristics of the crystal.

**The solution:** Fusing the cesium iodide crystal to a lithium fluoride faceplate and using the conventional silver chloride solder to attach the faceplate to the metal support.

**How it's done:** The cesium iodide crystal (m.p.= 621°C) is positioned on a polished lithium fluoride faceplate (m.p.= 870°C) and the two are heated under close temperature control in an inert atmosphere until a thin layer of the cesium iodide crystal melts and wets the contact face of the lithium fluoride crystal. The two crystals are then cooled to room temperature at a slow rate to assure a strong strain-free junction. To complete the process, silver chloride is used to solder the lithium fluoride faceplate to the metal support.

Temperature cycling of the crystal assembly presents no difficulties because the thermal expansion coefficients of the two crystals are closely matched.

### Notes:

1. By this method very thin scintillation crystals can be mounted on a transparent faceplate that is sufficiently stiff to resist flexing and consequent destruction of the vacuum seal.
2. This method may also be used to fuse a cesium iodide crystal of very thin cross section to a glass faceplate.
3. For further information about this innovation, inquiries may be directed to:

Technology Utilization Officer  
Goddard Space Flight Center  
Greenbelt, Maryland 20771  
Reference: B63-10476

**Patent status:** NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA Headquarters, Washington, D.C. 20546.

Source: Electro-Mechanical Research Inc.  
under contract to  
Goddard Space Flight Center  
(GSFC-67)